

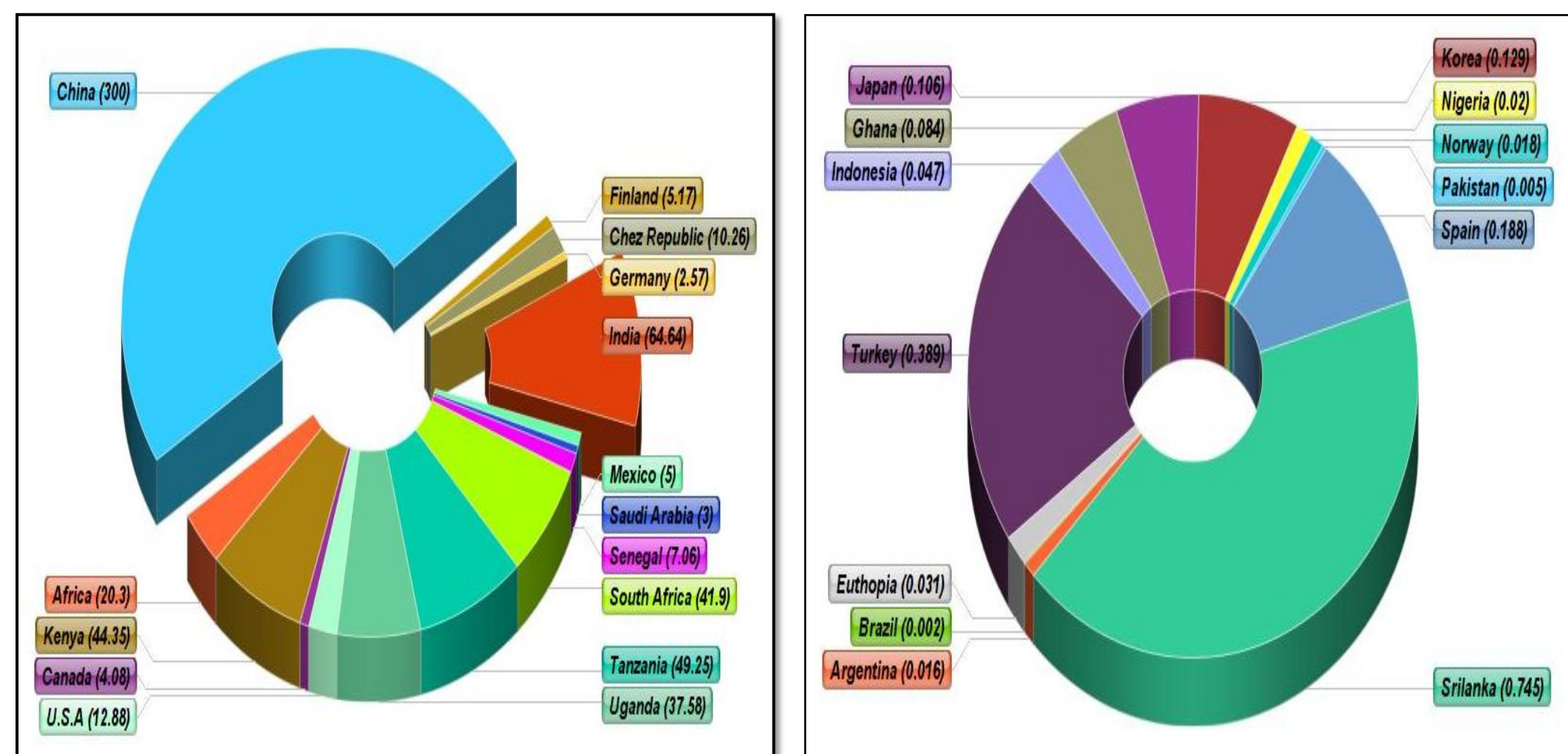
# Application of Geochemistry and Isotope to understand the process of Groundwater Fluoride Elevation in Granitic Aquifer



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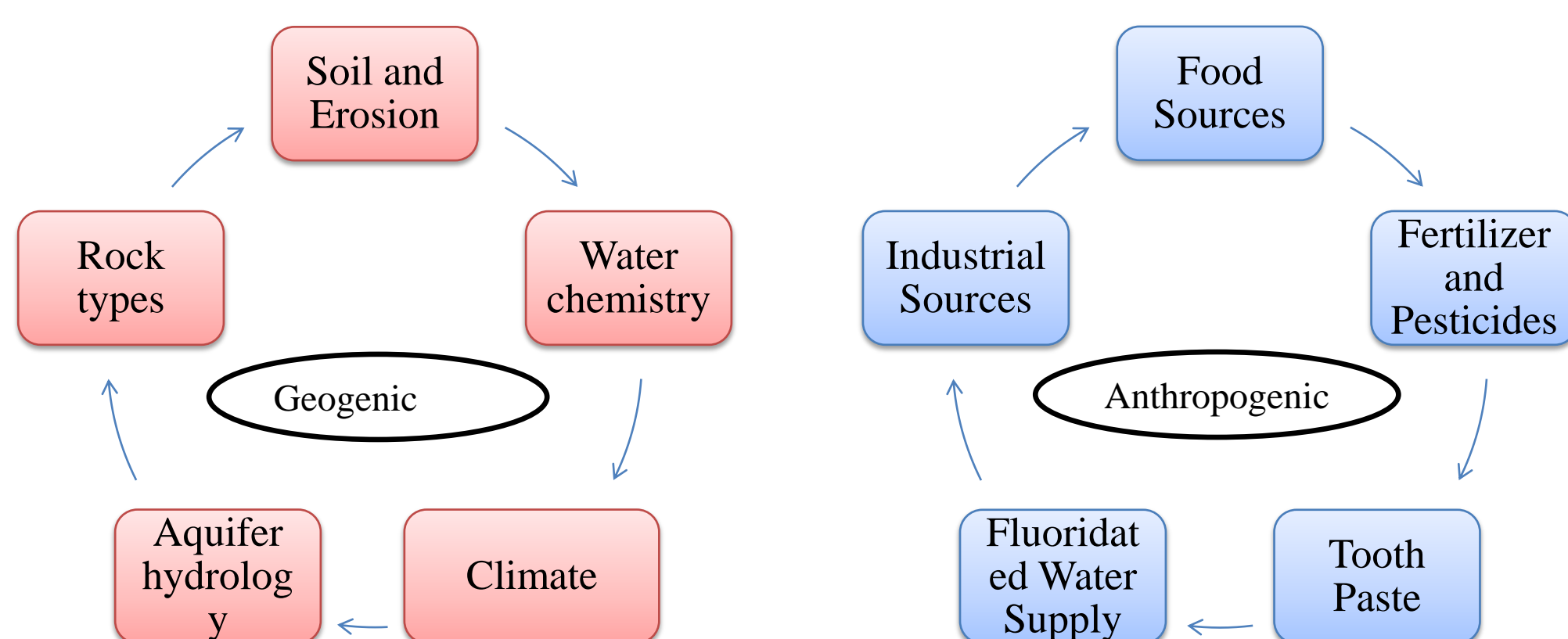


## Fluorosis and its endemic nature

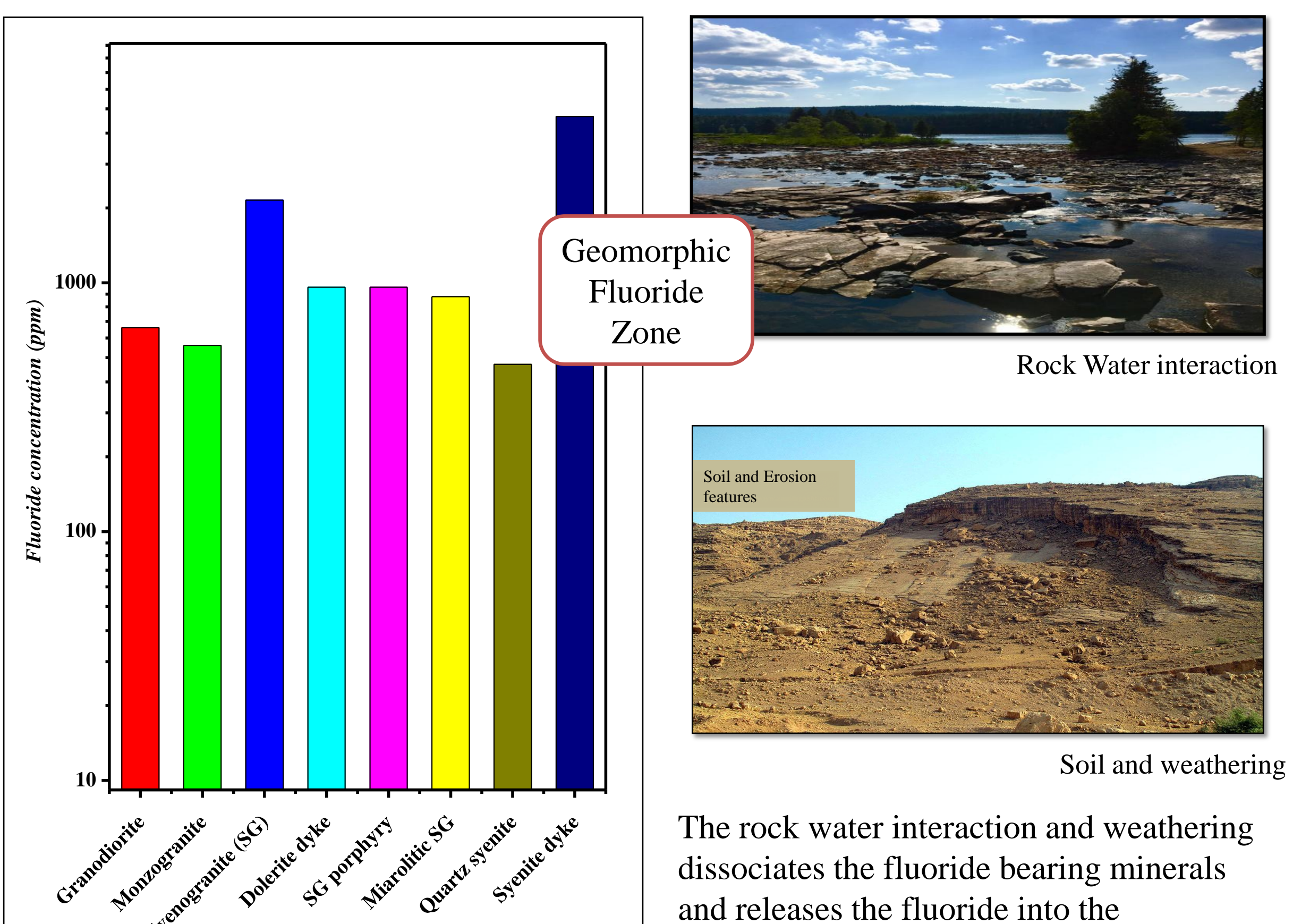
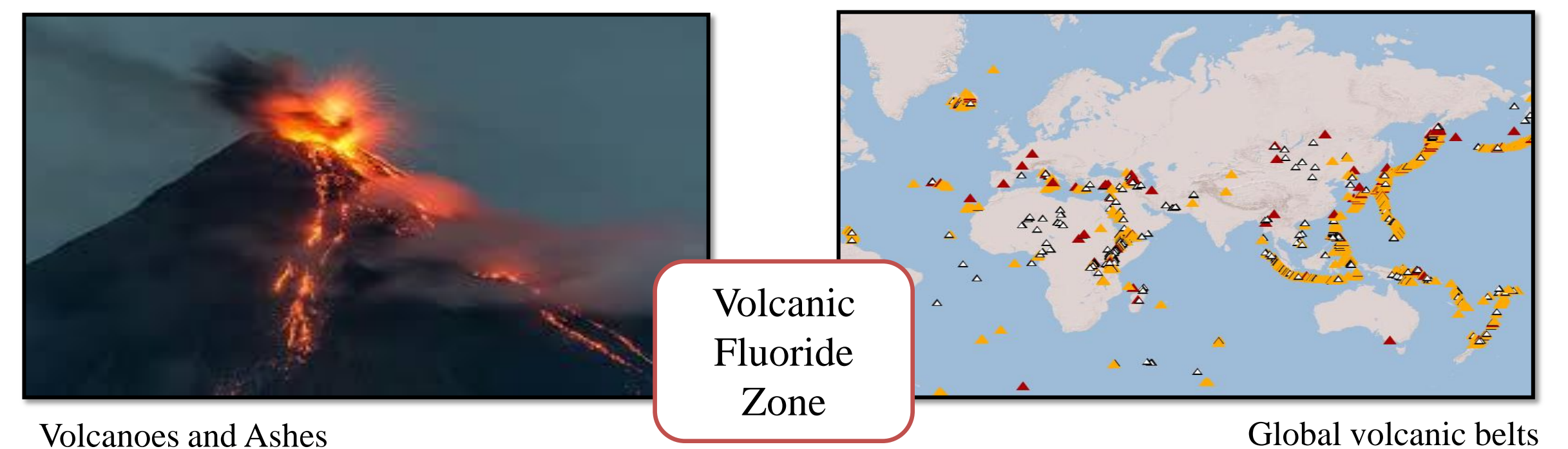


High fluoride in drinking water causes fluorosis (F > 1.5 ppm) and globally more than 300 million population is effected with fluorosis

## Geogenic and Anthropogenic Sources of Fluoride



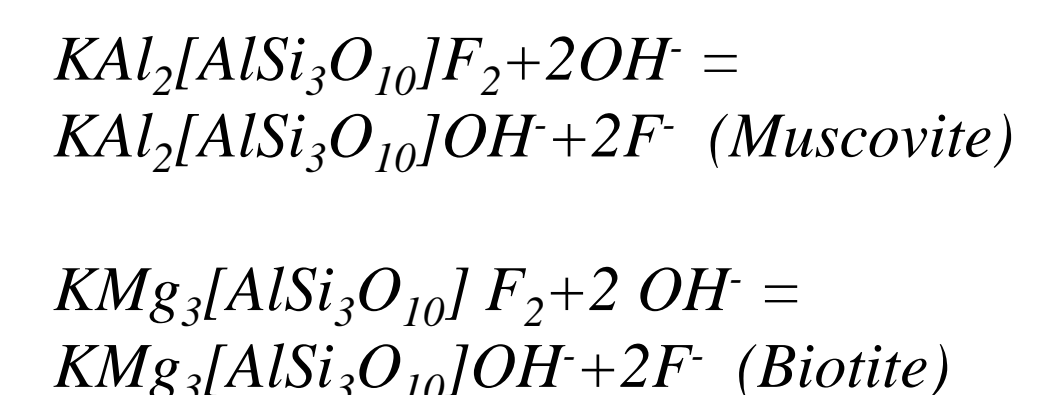
## Pathways of Fluoride into the Groundwater



The rock water interaction and weathering dissociates the fluoride bearing minerals and releases the fluoride into the groundwater.

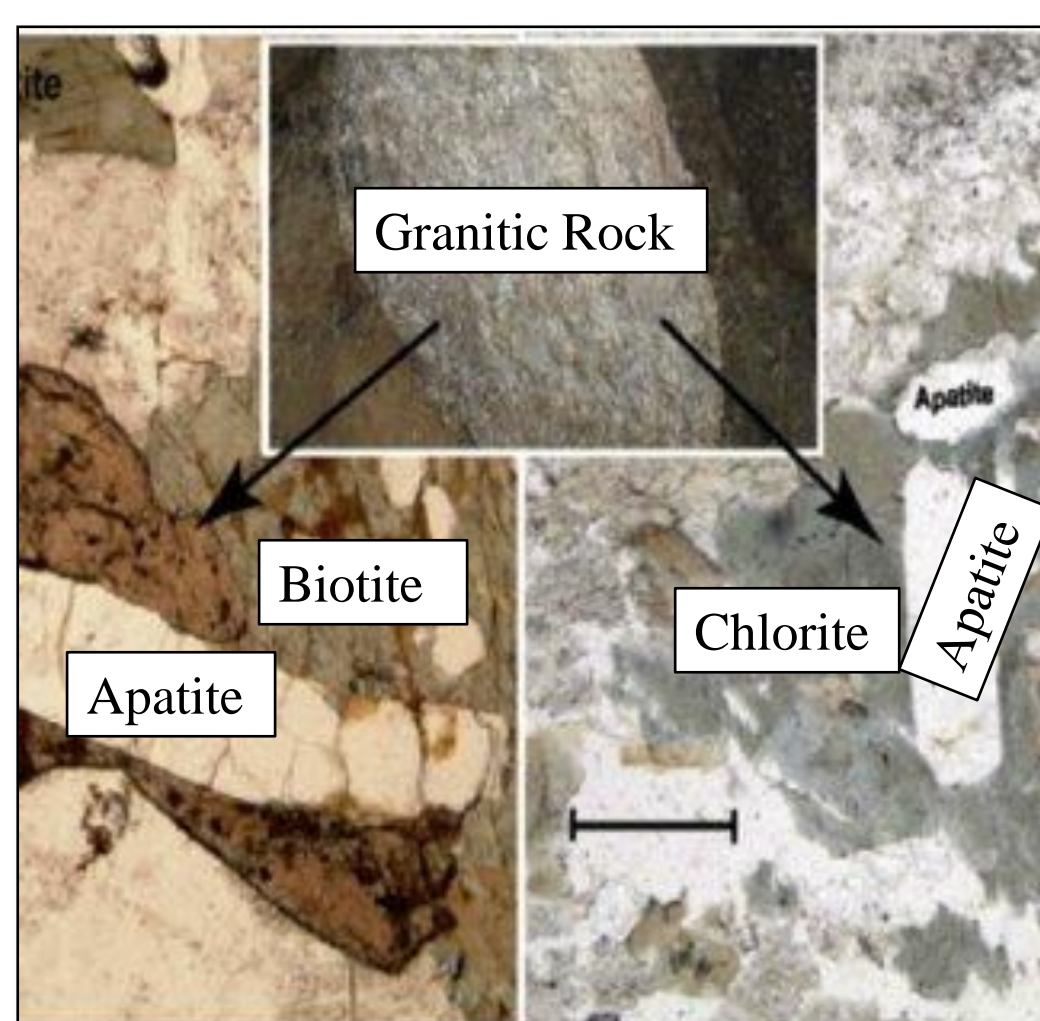
Different types of Rocks (Granitic family+ Others) and their fluoride content .

The volcanic ashes and volcanic soils have high amount of fluoride which gets easily incorporated into the groundwater due leaching of rain water.

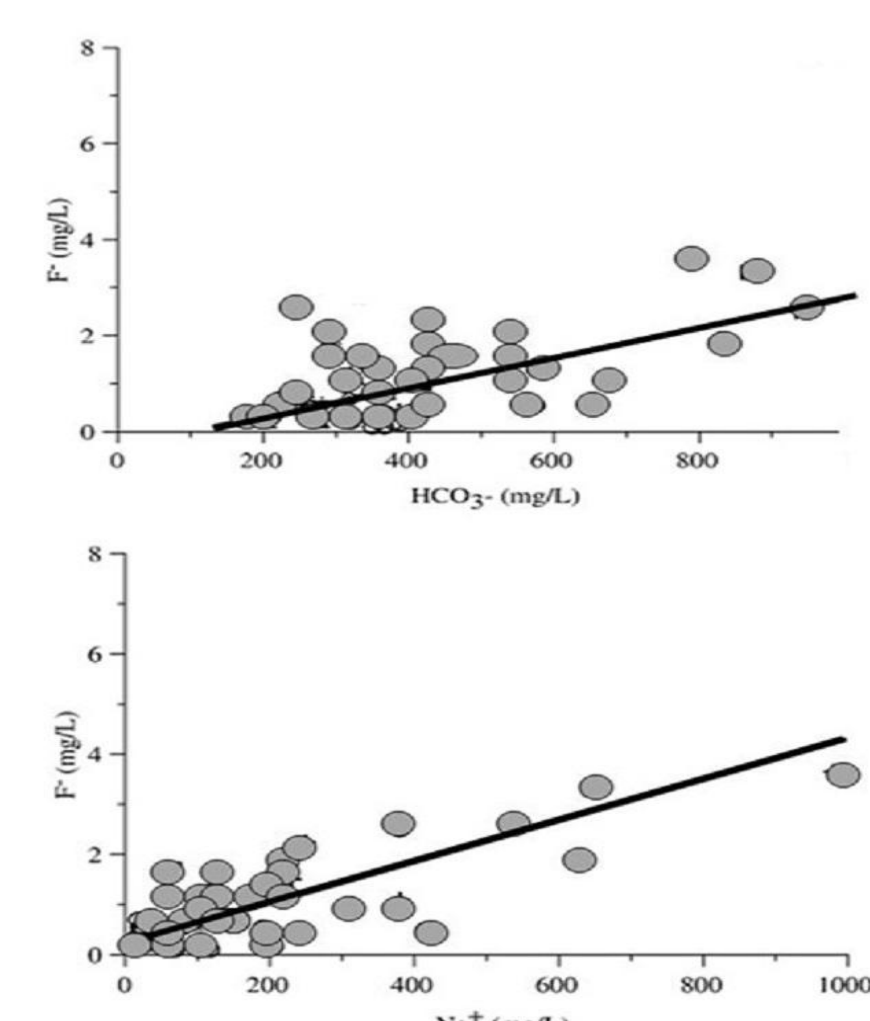


## Identifying the Sources of Fluoride

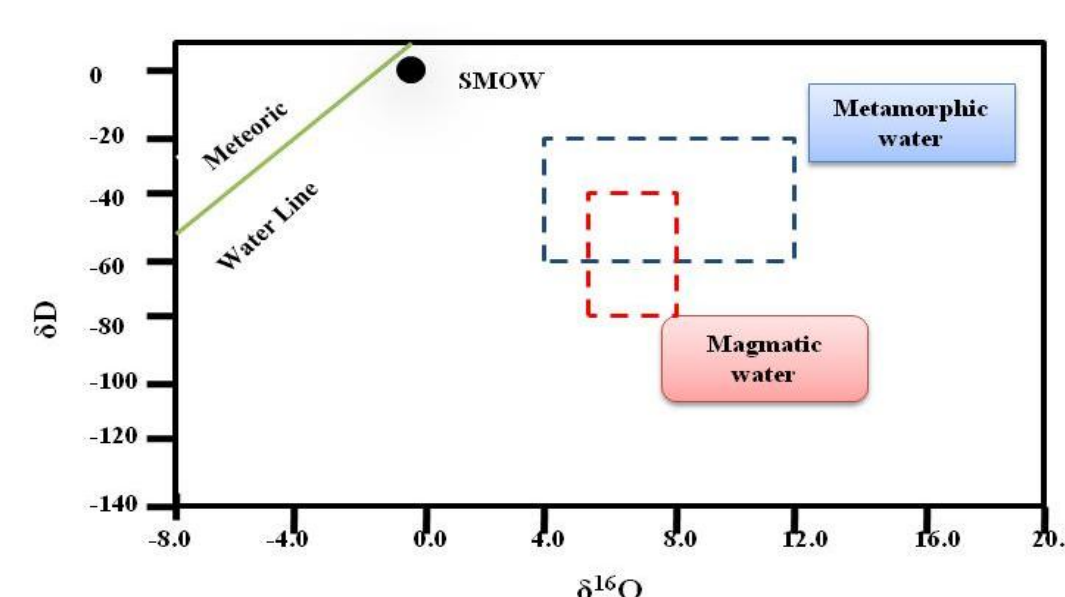
Two key techniques to understand the sources of fluoride is **geochemical** evidences and **isotopic** signature [1]  
The geochemistry of the rocks, rock-water interaction provides us with vital information to understand the mechanism of the fluoride dissolution into the groundwater [2]  
The isotopic signature can quantitatively evaluate fluoride from different sources



Rock with fluoride bearing minerals [3]



Fluoride vs other parameters of water[3]



Application of isotope in delineate the different sources of water and pollution

## Conclusions

1. The geogenic causes of fluoride contamination is the largest sources of groundwater fluoride contamination globally.
2. Granitic rocks and aquifers have higher susceptibility of Fluoride contamination due to high fluoride in the rocks.
3. The common way of fluoride incorporation form soil is leaching while rock water interaction and weathering are key mechanism of fluoride dissolution and contamination in groundwater .
4. Geochemistry particularly isotopes can be used to delineate the fluoride sources and its pathways with high precision and accuracy.

## Reference

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4. Clark, I. and Fritz P. (1997). Environmental Isotopes in Hydrogeology, Lewis Publishers.